



← GRC ATF

[The need for]

An Open CSP Community

[for wiki-based business process tooling]

An Open CSP **Developer** Community + An Open CP **User** Community

Richard Evans

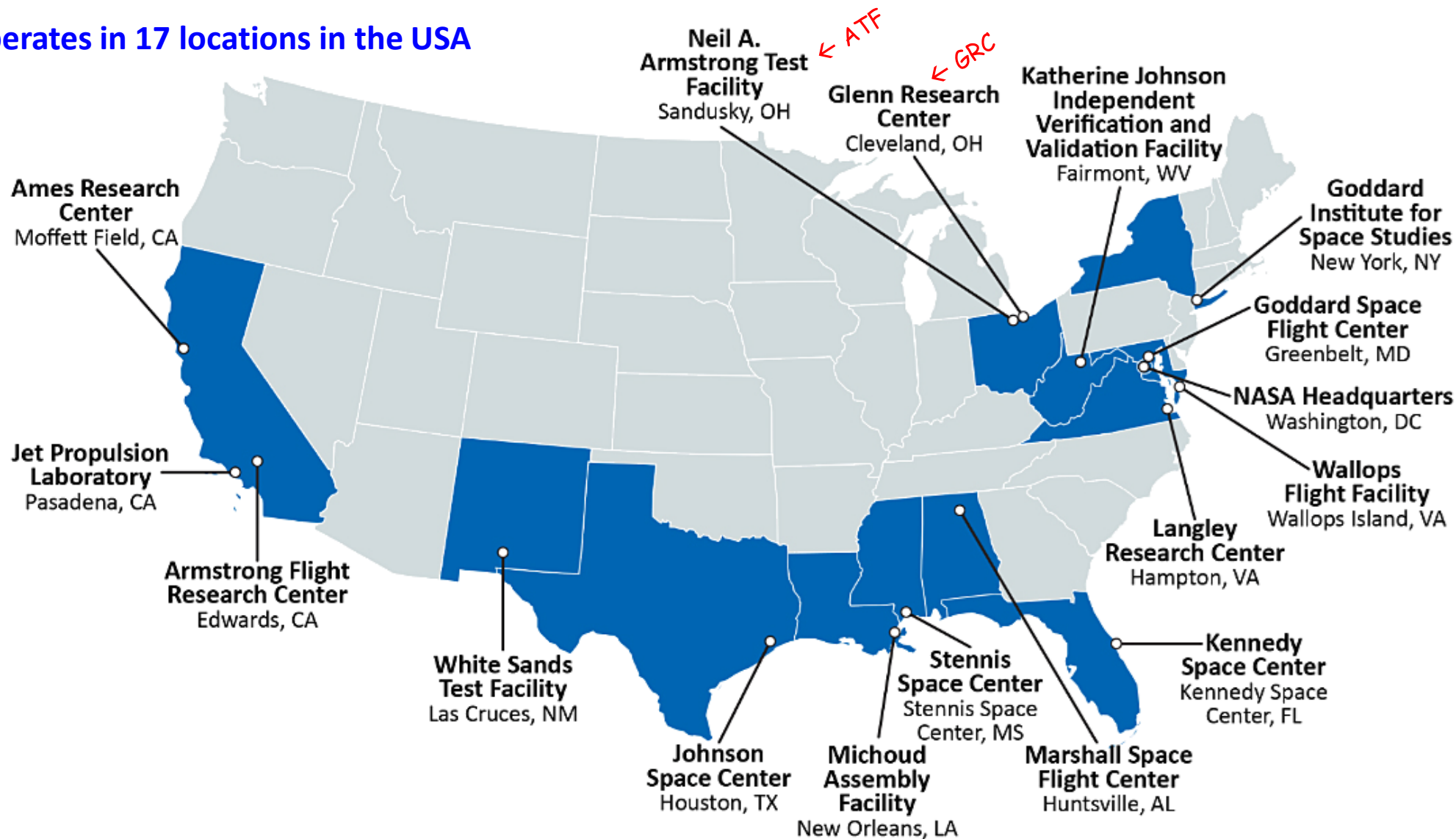
NASA GRC Armstrong Test Facility

SMWCon Fall 2022



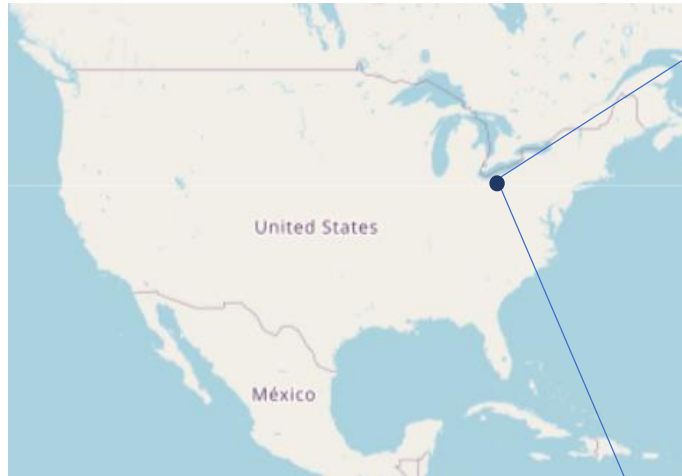
But first.. Where is NASA?

NASA operates in 17 locations in the USA



..And what is the Neil A. Armstrong Test Facility?

GRC-ATF is a 6,400 acre (~26 km²) spaceflight testing facility for NASA in rural Ohio near Lake Erie

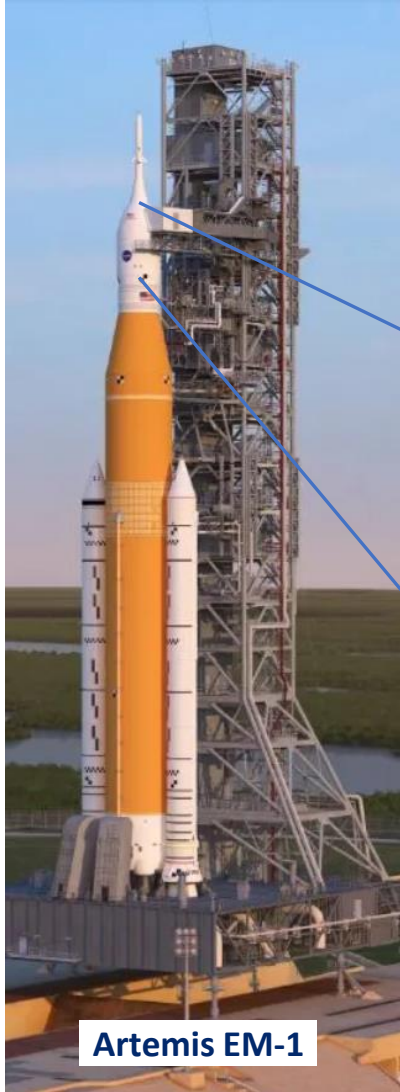


https://en.wikipedia.org/wiki/Glenn_Research_Center#Neil_A._Armstrong_Test_Facility

..And what does NASA do at the Neil A. Armstrong Test Facility?

To our customers, Armstrong Test Facility (ATF) is:

- ❑ A 6,400-acre (25.9 km²) spaceflight testing facility for NASA in rural Ohio near Lake Erie
- ❑ Home to several of the “worlds largest and most powerful” space environment test chambers (vacuum, acoustics, electromagnetics, vibration, altitude engine testing)
- ❑ Place where NASA and private industry test very large spacecraft in order to prove that they can survive the harsh conditions of launch, orbit, and re-entry



Artemis EM-1



SpaceX Falcon 9

For the purposes of today's talk, ATF is:

- ❑ About 120 technical and non-technical knowledge workers operating ~6 testing facilities
- ❑ Trying to do more with less
- ❑ Trying to comply with federal directives for electronic records (OMB M-19-21) [1]
- ❑ Trying to modernize our methods according to best practices (OMB M-16-21) [2]
- ❑ Running a local SMW+ server for all our “Knowledge Management” (KM) needs since 2008

*Paperless
Seek Open Source*



Why is NASA GRC's Armstrong Test Facility using Semantic MediaWiki?

But first.. What did I do before SMW?

Before NASA I worked at a U.S. National Lab in Virginia



1995

Accelerator Control System
Beamline Instrumentation Engineer

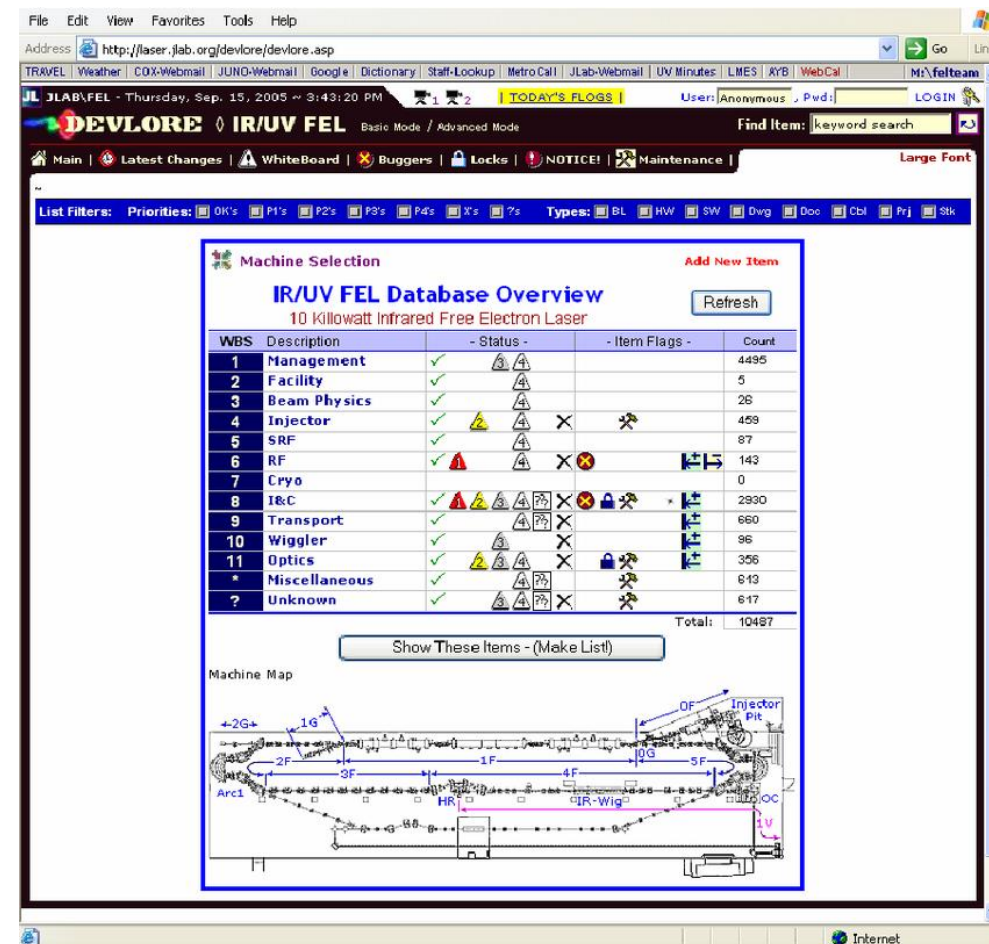


Discovered MediaWiki
(~2005)

2007

- In ~1997 I set-up an internal IIS server (**DEVLORE**, ICALEPCS 2005)
- Primary motivation was to manage custom firmware we developed

DevLore was an IIS website that was *hand-written* in **ASP** over the course of 10 years with an **MS-Access** database backend that was accessed by ASP using **ODBC**





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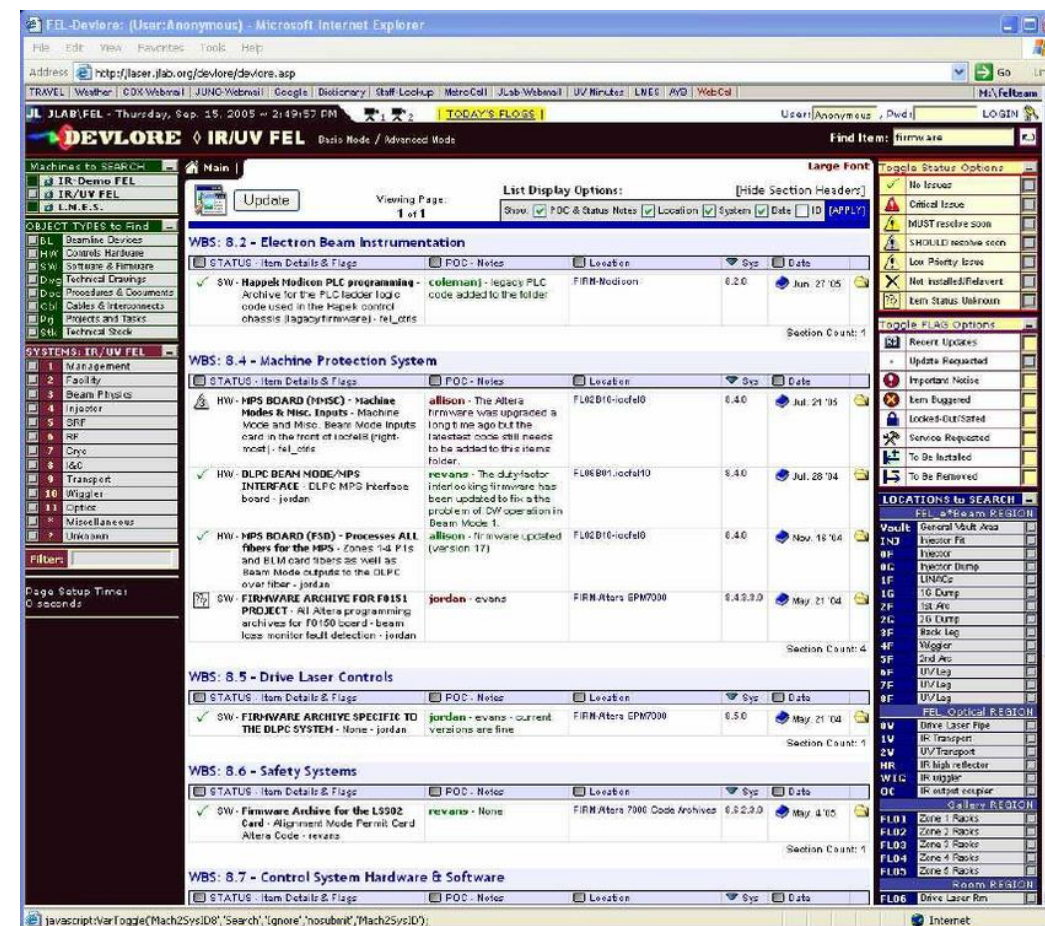
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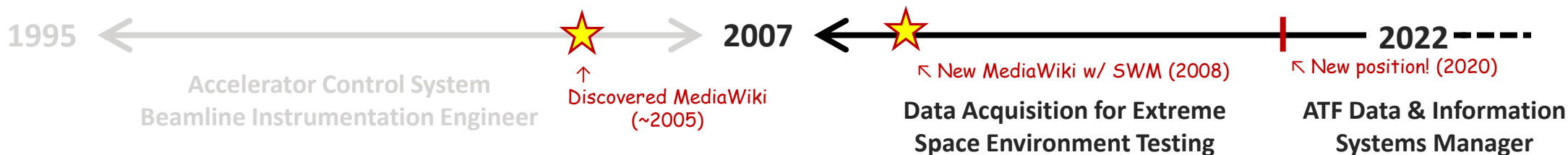
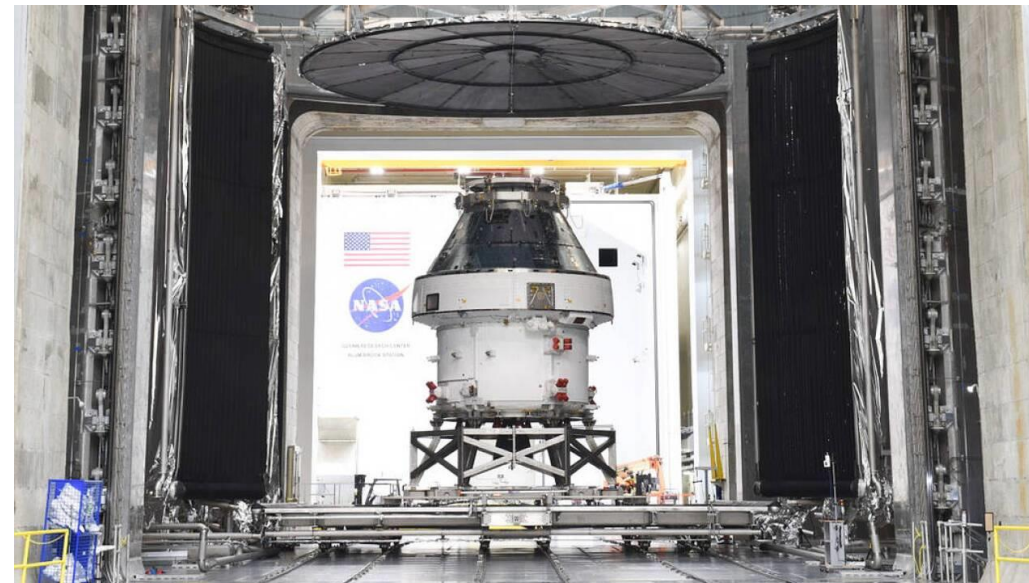
Why is NASA GRC's Armstrong Test Facility using Semantic MediaWiki?

But first.. What did I do before SMW? This time I'll use MediaWiki

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In 2007 started at NASA



- In ~1997 I set-up an IIS server
- Over the next 10 years I hand-coded my own ASP/ODBC documentation website
- Primary motivation was to manage custom firmware we developed

- In ~2008 I set-up an internal MediaWiki server
- Primary motivation was to manage **ALL** of our internal system documentation
- In 2018 I discovered and switched to **MEZA** (Ref: J.Montalvo, Daren Welsh, et al)

Where does MediaWiki fit in in the *constellation* of software groups?

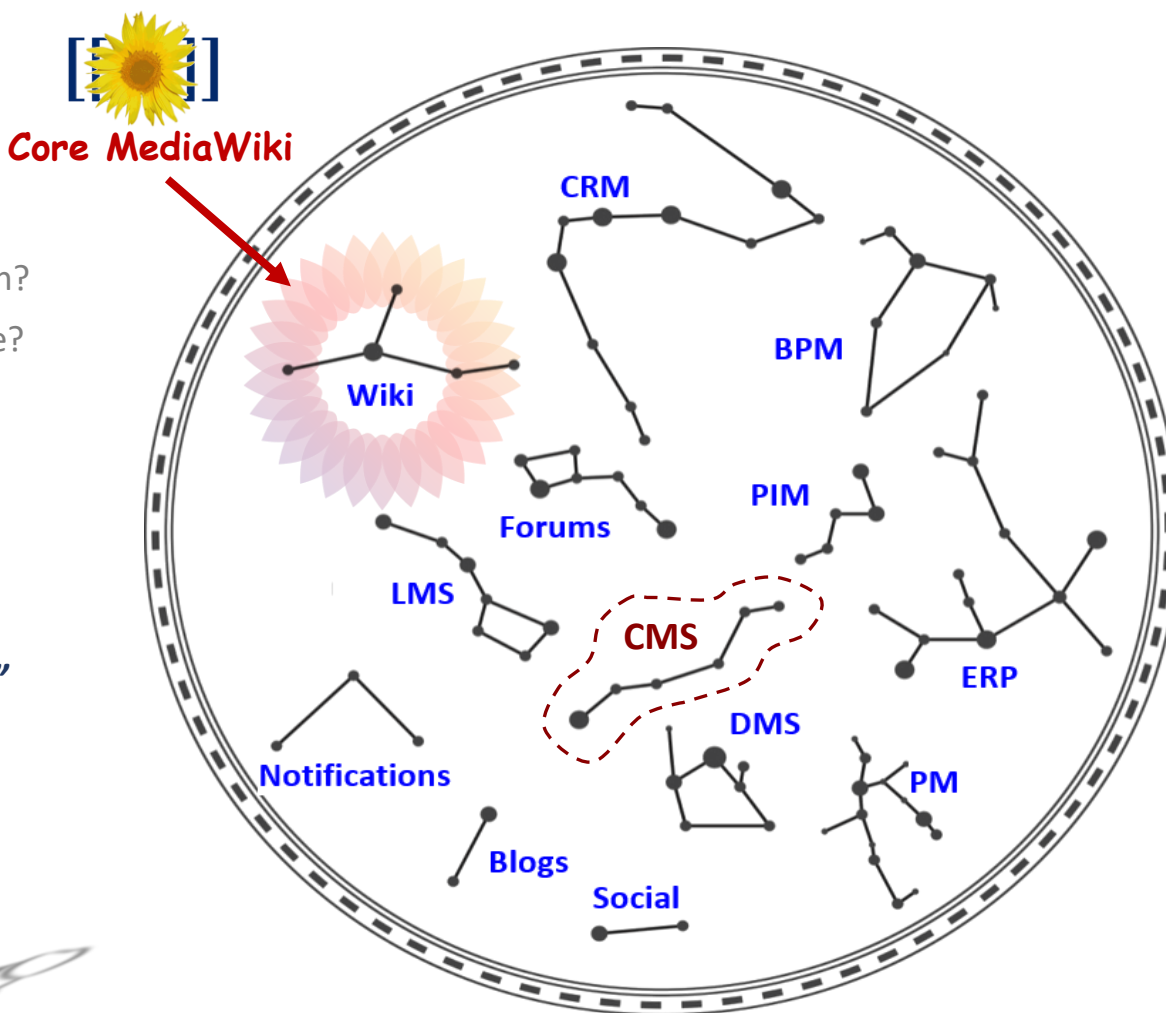
Business Questions

- What do each of them do?
- How much do they cost?
- Which ones are secure?
- How hard are they to maintain?
- What features does each have?
- What about things that are specific to my organization?
- Who will tailor all this to my organization?

“Which ones do I need?”



Decision
Maker



Core MediaWiki is just wiki software

Different Software Types

Management Systems

- **CMS** Content Management
- **DMS** Document Management
- **LMS** Learning Management
- **PM** Project Management
- **DAM** Digital Asset Management
- **PHOTO** Management

Process & Data

- **BPM** Business Processes
- **CRM** Customer Relationship
- **ERP** Enterprise Resource
- **PIM** Product Information
- **Notification System**

Social Platforms

- **Wiki** ← Core MediaWiki
- **Blog**
- **Forum**
- **Social**

What I've learned over the years about "Semantic MediaWiki"

With SMW + extensions:

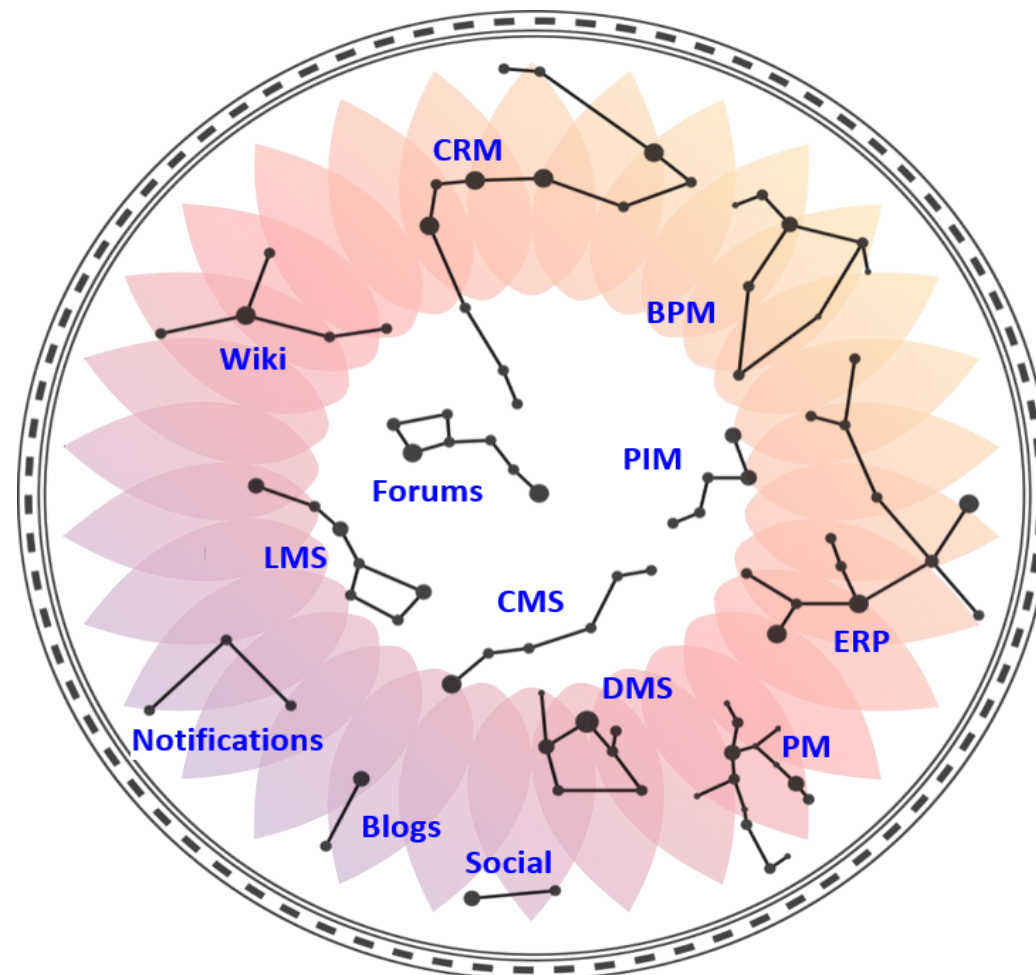
Fun Fact #1 – You can **store data** in pages

Fun Fact #2 – You can **query data** in pages

Fun Fact #3 – You can turn MW into a
Database Application platform

Fun Fact #4 – you can use MW for
Form-Based Business Process Tooling

*"Is there anything I can't
use Mediawiki for?"*



**SMW+ enables Mediawiki to become so
much more than *just* wiki software**

MediaWiki



+ **Semantic MediaWiki**

+ Other Extensions

+ **Site Content** (Templates, Forms, Categories)

= An *All-In-One*

Multi-purpose

Web-based

DB-driven

Interactive

Collaborative

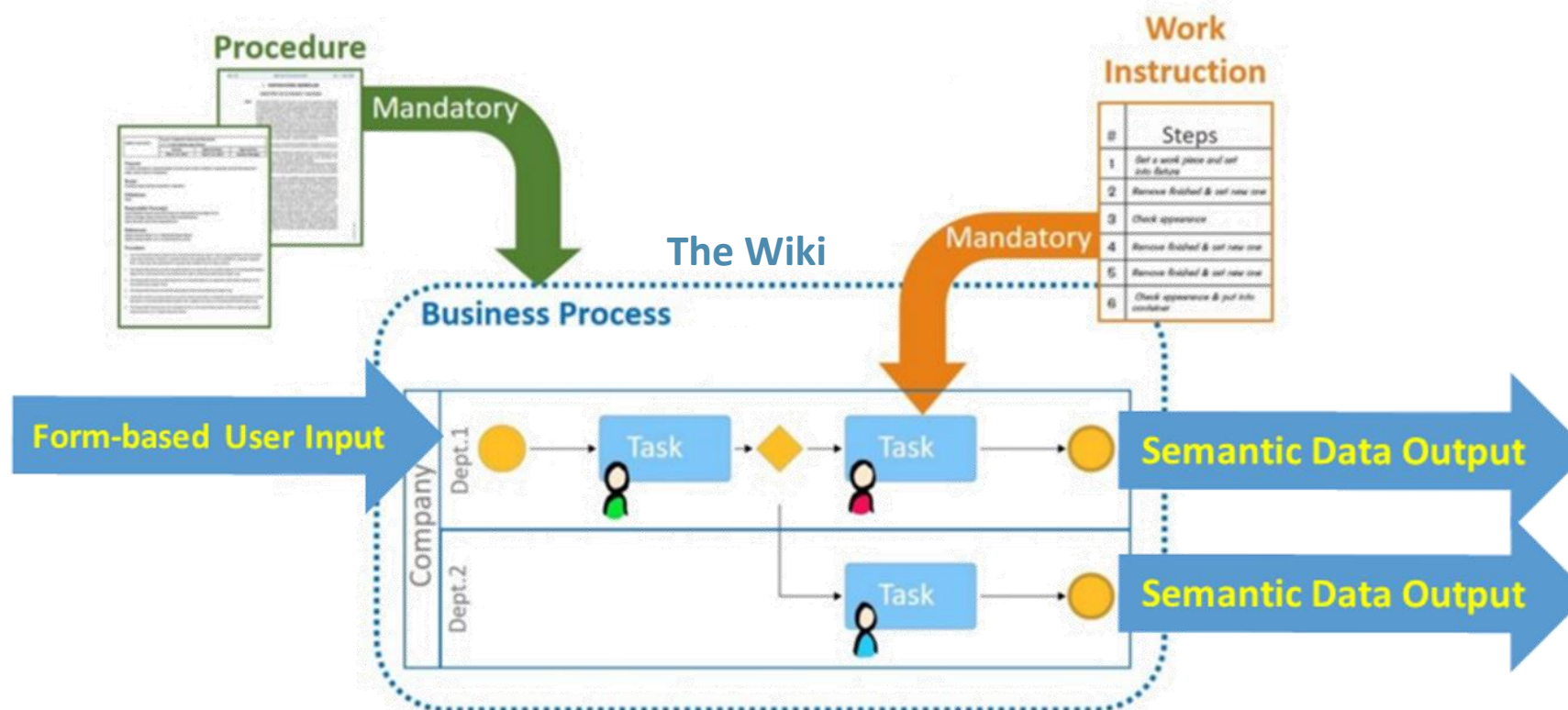
Fully Open-Source

Content **S**ervice **P**latform

In the broadest sense

So.. Why is NASA GRC Armstrong Test Facility using Semantic MediaWiki?

Because .. We can use SMW+ to implement all-electronic all open-source ISO compliant internal Business Processes



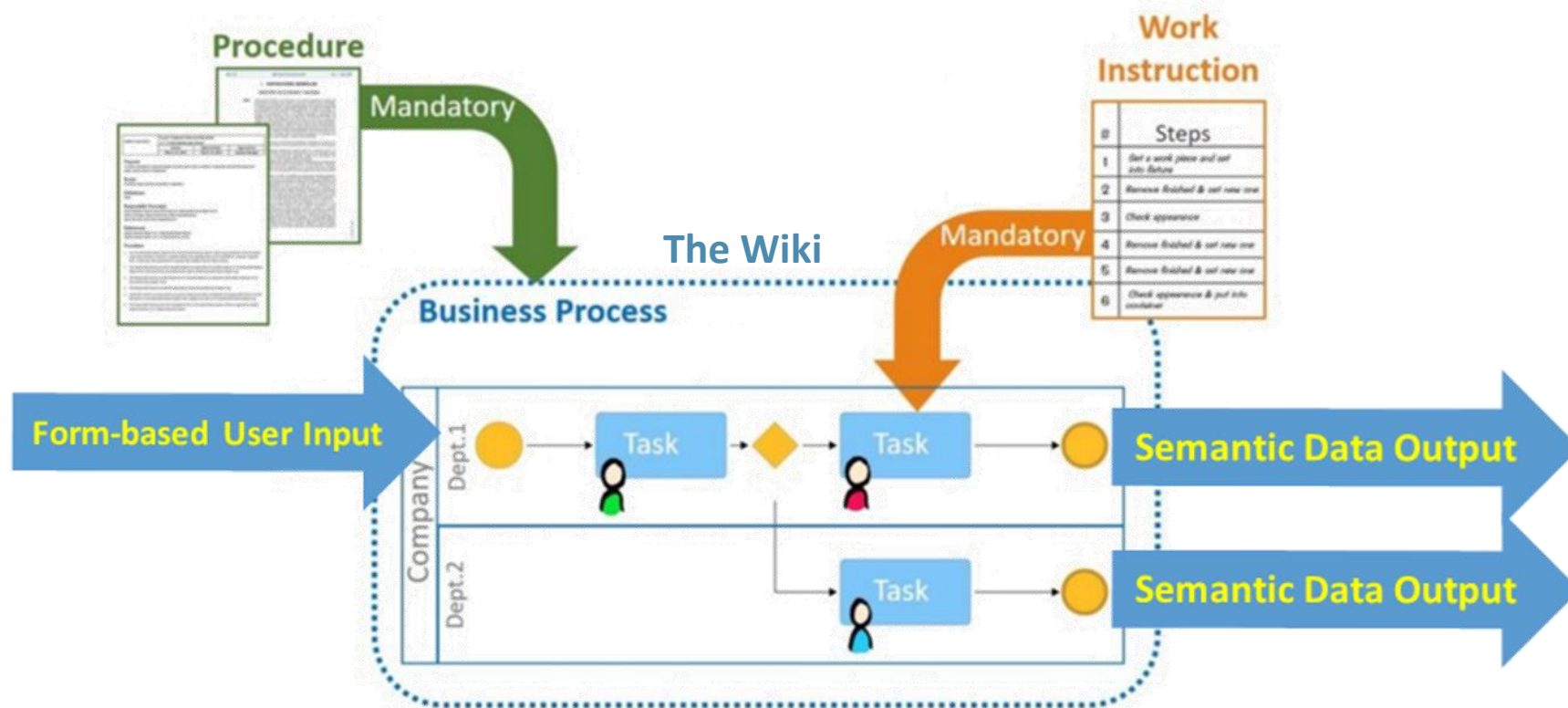
A universal ISO business process diagram

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Processes we have implemented:

- Site-wide Notifications
- Document Control
- Document Change Requests
- Facility Change Requests
- Risk Management
- Travel Planning
- Training Planning
- Lessons Learned
- Attendance Recording
- Meeting Minutes
- Actions and Issue Tracking
- Project Initiation
- Project Execution
- Project Close-out
- System Management
- Software Inventory
- Equipment Inventory
- Process Safety Management
- Cybersecurity Compliance
- Requirements Management



A universal ISO business process diagram

In-work: Facility Work Instructions (Checksheets) – based on work performed by Wikibase Solutions using Open CSP

So.. Why is NASA GRC Armstrong Test Facility using Semantic MediaWiki?

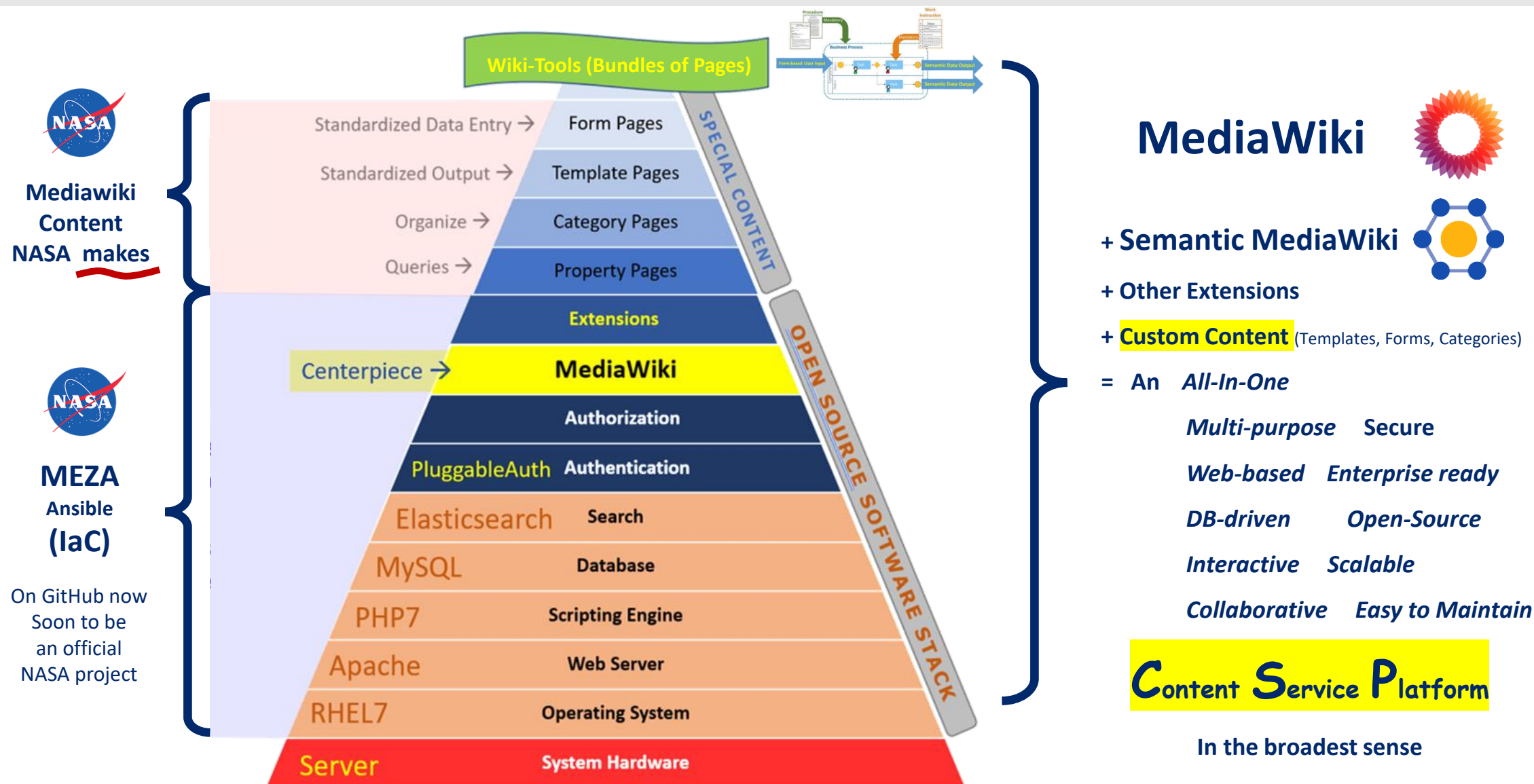
Also because .. We can use **SMW+** as a **Knowledge Graph (KG)** Interface to do **ML/AI** and **NLP (Natural Language Processing)**



For more information on this aspect, please see my talk from SMWCon Fall 2021



How we built an entirely “Open-Source Wiki-Based Content Management System” to implement all-electronic work processes





How to we ensure long-term support for all this?

(i.e. Lifecycle Planning)

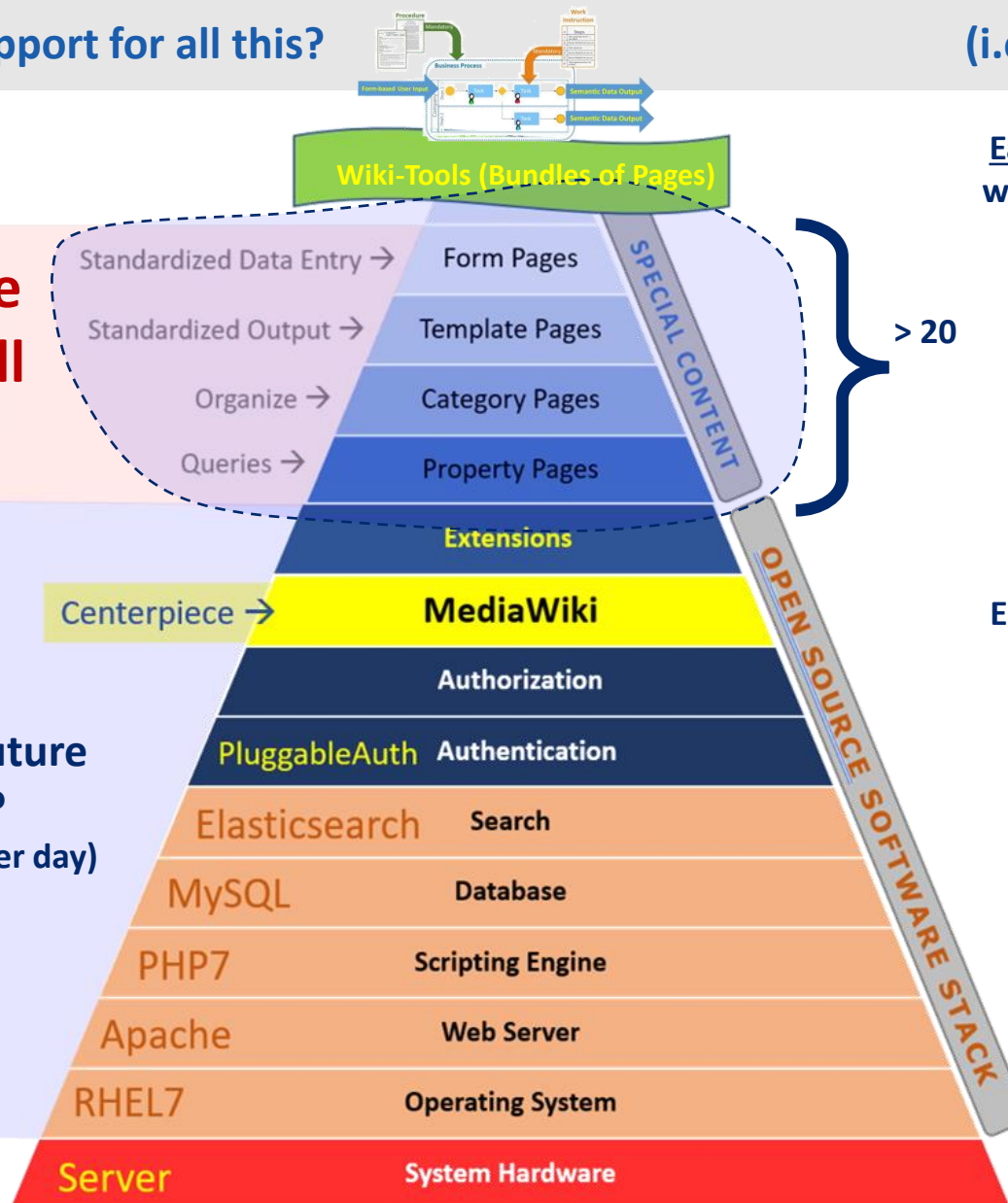

Mediawiki
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Each Wiki-based Tool is a bundle of wiki pages that work together to produce the overall tool capability

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Each Tool Bundle must be version controlled

Each Tool Bundle must be separately tested to work as intended and meet all requirements

Right now only NASA GRC-ATF is working on NASA GRC-ATFs wiki tools

Hundreds of hours

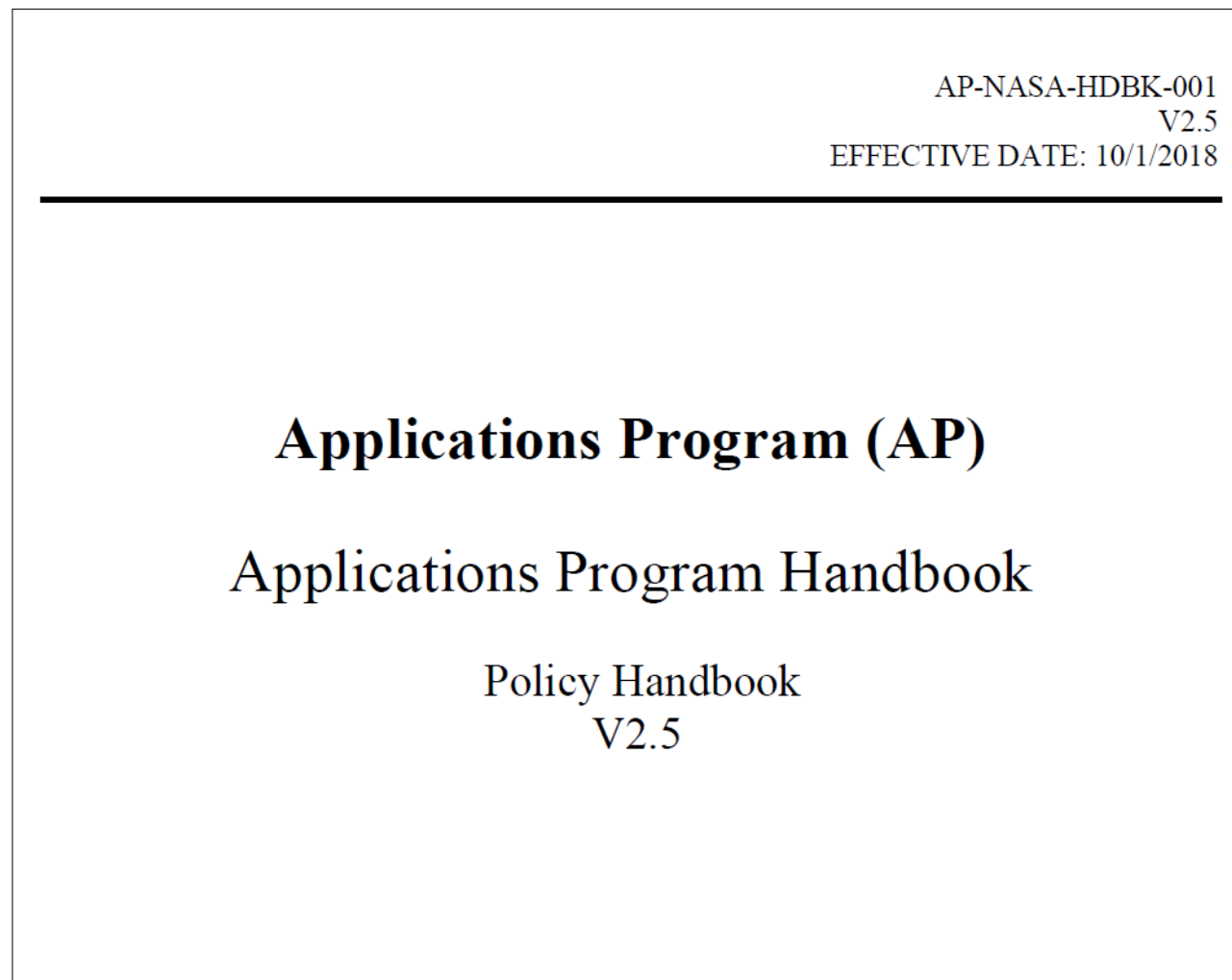
Thousands of pages

**Is this becoming
DevLore II?**



What does NASA's Application Programming Handbook have to say?

NASA's Application Programming Handbook (AP-NASA-HDBK-001 v)



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Seek software built with a modern (web) architecture

4.3.1.1 Applications Program architectural vision: Facilitate the acquisition and development of applications that have the following characteristics:

- Loosely coupled
 - Interface ideally at the API/protocol layer, rather than within the code itself
 - No point-to-point connections
- Modular
- Interoperable
- Contain minimal duplicative code/functionality
- Open standards-based
- Platform agnostic
 - Achievable by interface contracts (see loosely coupled) rather than integrated code/modules
- Intuitive to use, user friendly, and understandable
- • Low total cost of ownership
- • Reduce duplication and cost across government for shared administrative functions
- • Contribute to overall reduction of IT costs across NASA (e.g., developed application would contribute through areas like elimination of redundancy, transforming to Enterprise solutions, and cloud, virtual, and purposeful architectures. Likewise, acquired applications would contribute through consolidated licensing, Enterprise licensing, and re-negotiation of licensing where appropriate.)

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Seek Vendor Independence

4.3.1.2 Strive for vendor independence through the use of open source software.

Rationale: While the importance of using Commercial Off-The-Shelf (COTS) products may be clear in some cases, without careful application of COTS, vendor dependence will likely occur. Approved Free and Open Source Software (FOSS) is encouraged to reduce cost and increase vendor independence. This approach (vendor independence) fosters use of the best available COTS or FOSS solutions and provides the flexibility to replace individual products as business or technical needs dictate. Generally, FOSS follows open standards and allows NASA to retain expertise in development and maintenance of the software. Another benefit is the availability of third parties that offer free and premium support for FOSS.

Source: OMB M-16-21, Federal Source Code Policy: Achieving Efficiency, Transparency, and Innovation through Reusable and Open Source Software, (Aug 8, 2016)



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Avoid custom solutions

4.3.1.3 Application development should utilize Open Source, GOTS (Government Off-The-Shelf, like GSA's), and COTS solutions over custom built solutions. This includes cloud offerings.

Rationale: Software applications are expensive to develop in house. Leveraging outside sources lowers the cost to NASA. However, it is acknowledged that retaining in-house expertise in the software is important, hence the preference for open source software. In many cases, COTS applications may be more expensive to maintain than comparable custom-built applications, for a number of reasons: high customization costs, dependence on particular versions of support systems (e.g., OS, database, etc.), patching, security updates, forced upgrades due to software end-of-life, change management, etc. In these cases, COTS solutions have a lower preference within NASA than custom-built solutions, all other considerations being equal.

Source: Adding Sources of Costs in Maintaining COTS-Intensive Systems, Dr. Betsy Clark and Dr. Brad Clark, Software Metrics Inc.,
<https://pdfs.semanticscholar.org/d1f0/a376c487a71005b0d4ff2a54f150e3855139.pdf>

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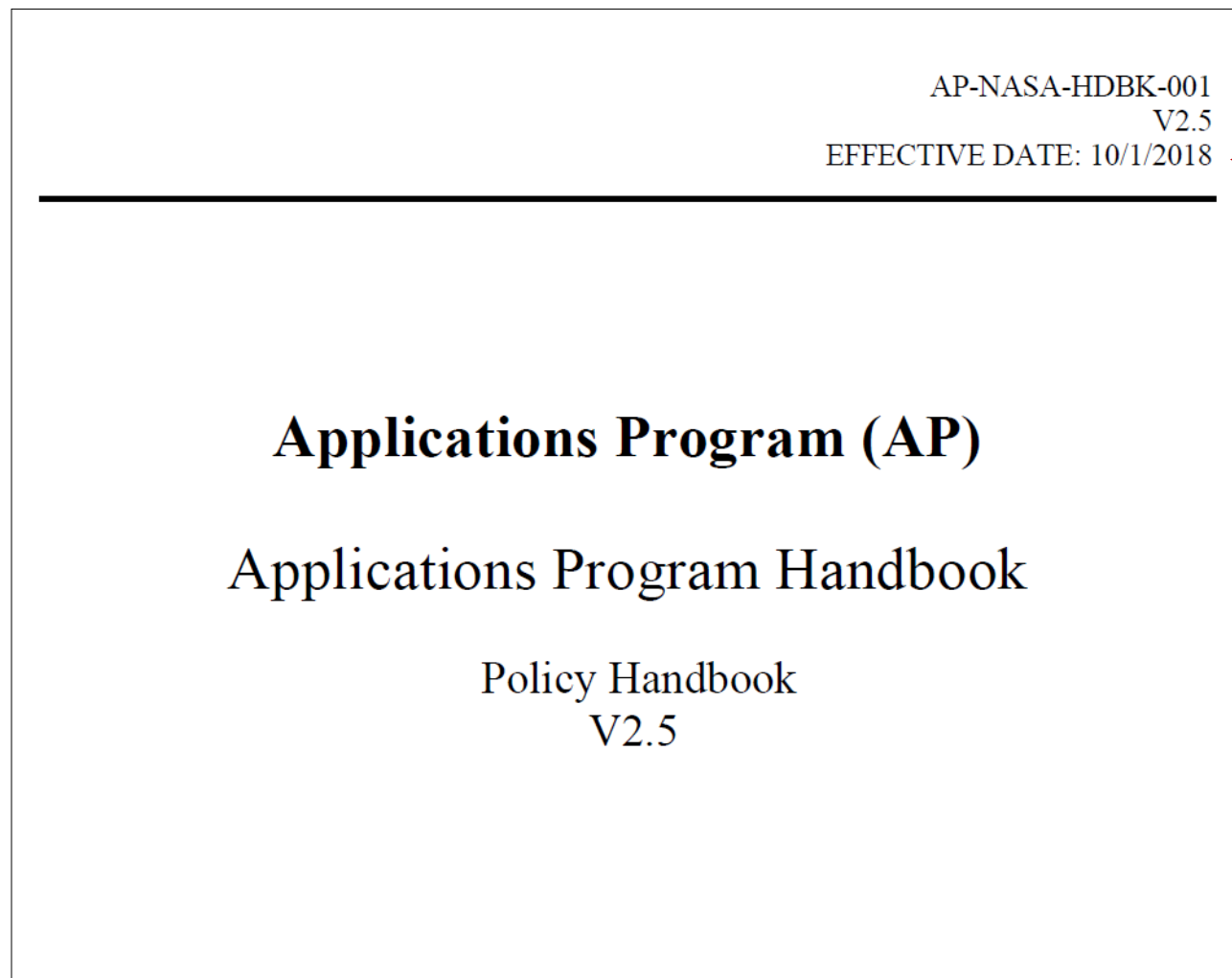
Stick to standard tooling

4.3.1.4 COTS applications should not be customized to meet business processes. Business processes should be configured to follow out-of-the-box application flows.

Rationale: Customizing applications to suit specific needs is expensive. Furthermore, if an application is customized it frequently can no longer be updated with ease. Application customization can also result in difficulties in interoperation with other modules of the same application. Although this can't always be accomplished, development communities will continue to assist in identifying the correct COTS product needed to fit the customer requirements.

What does NASA's Application Programming Handbook have to say?

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1. Seek software built with a modern (web) architecture
2. Seek Vendor Independence
3. Avoid custom solutions
4. Stick to standard tooling



How do we ensure long-term support for all this?

(i.e. Lifecycle Planning)


Mediawiki
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**What is the
future of all
this?**

Wiki-Tools (Bundles of Pages)

Standardized Data Entry →
 Standardized Output →
 Organize →
 Queries →

Form Pages
 Template Pages
 Category Pages
 Property Pages

SPECIAL CONTENT

> 20

Extensions

Centerpiece →

MediaWiki

Authorization

PluggableAuth Authentication

Elasticsearch Search

MySQL Database

PHP7 Scripting Engine

Apache Web Server

RHEL7 Operating System

Server System Hardware

OPEN SOURCE SOFTWARE STACK

**And
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of MEZA?
(a topic for another day)**



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Hundreds of hours

Thousands of pages

Is this becoming DevLore II?

Wouldn't it be nice if there was a non-profit Open-Source Community Project that was interested in providing an online repository of pre-developed tool page bundles that we can contribute our work to.



Summary

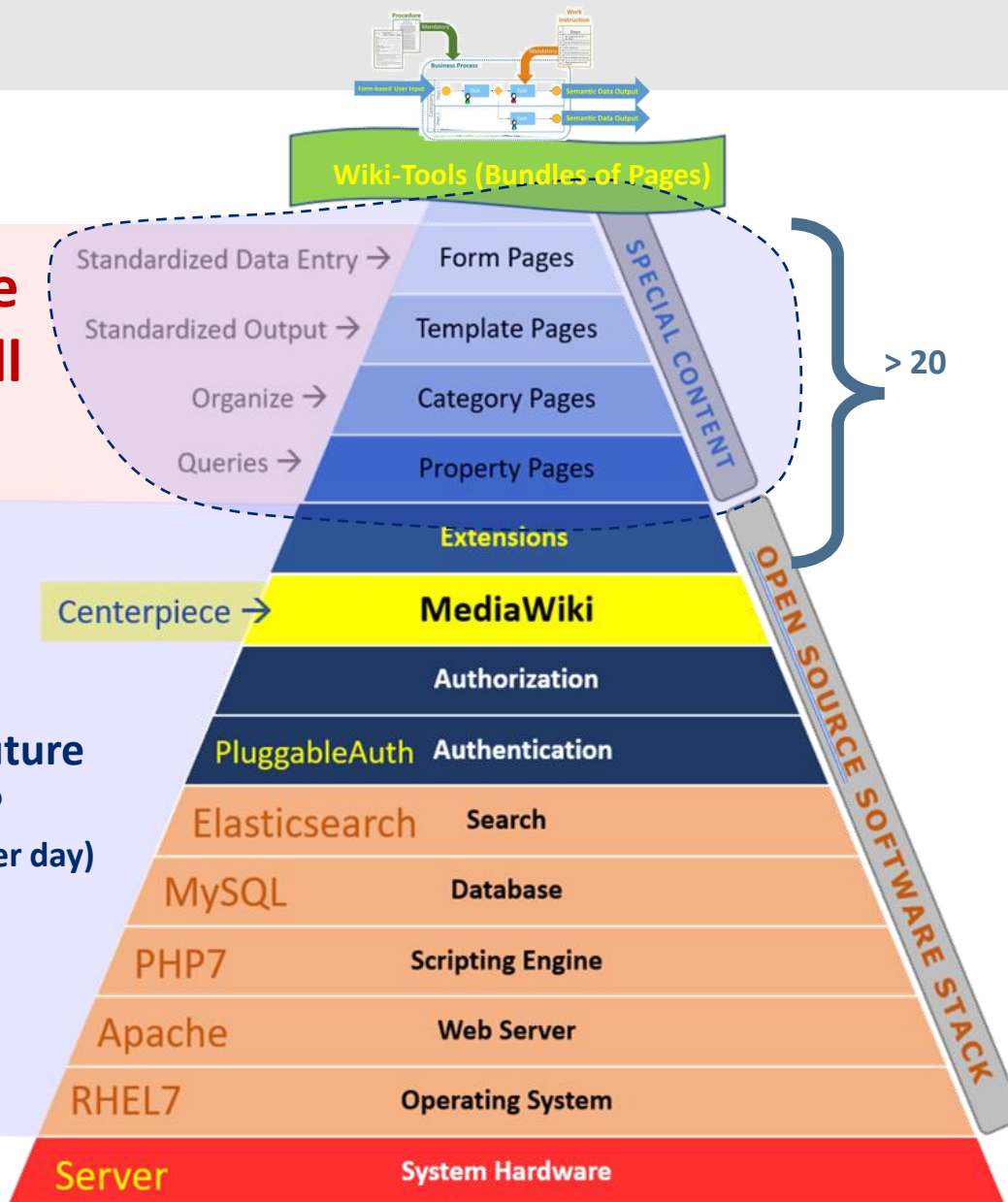

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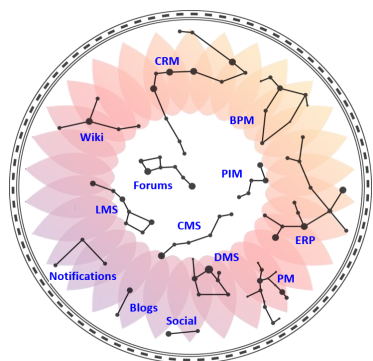
OPEN CSP

THE OPEN-SOURCE CONTENT SERVICES PLATFORM

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6. Low Total Cost of Ownseship



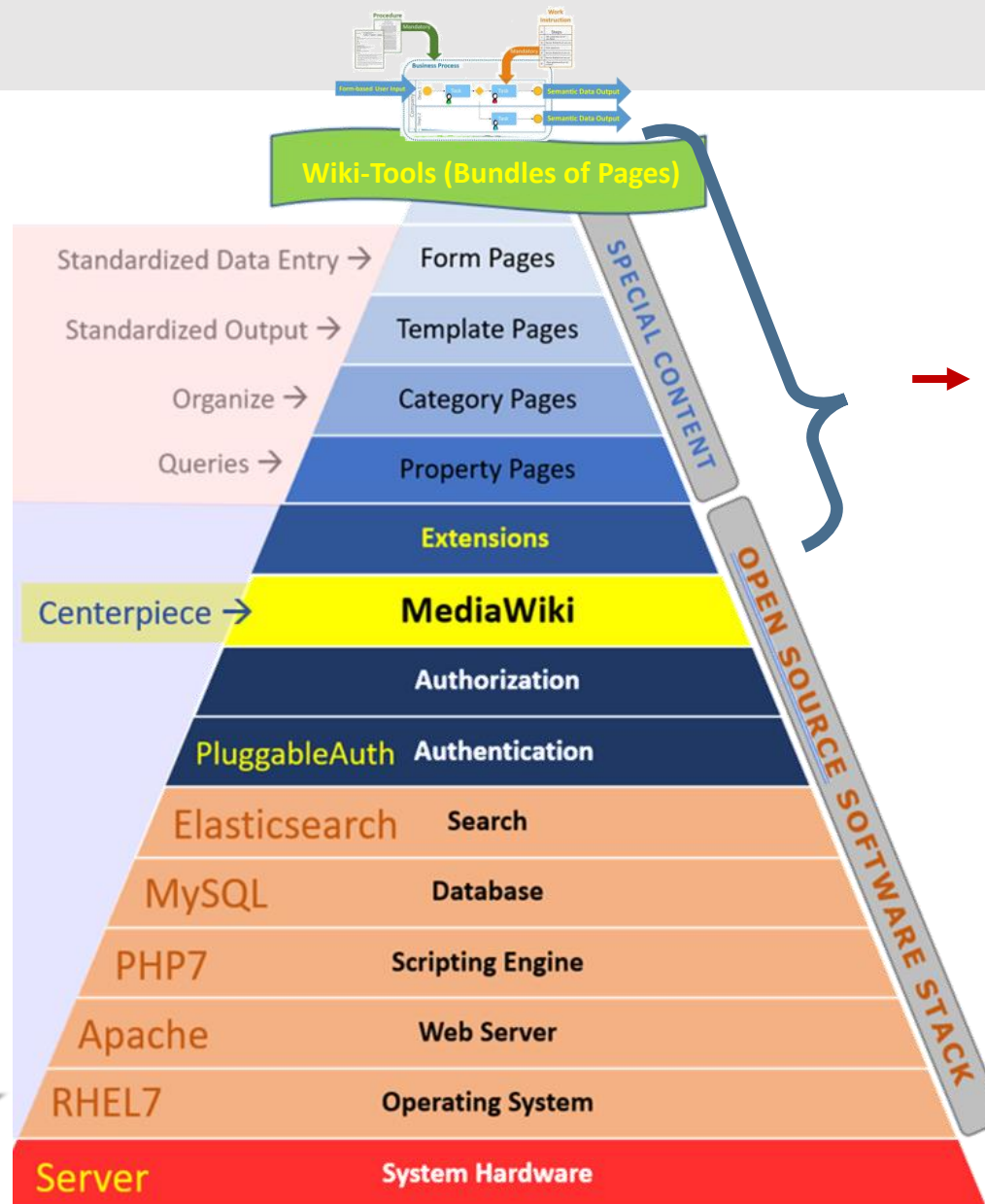
Summary



“I can get all these standardized software workflow tools for my organization using only MediaWiki and Open CSP”



Decision Maker



<https://www.open-csp.org/>

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How can NASA GRC-ATF achieve long-term support for all this work? (i.e. Lifecycle Planning)

NASA GRC-ATF seeks a non-profit, community-supported, Open-Source project to serve as the long-term home for the bundles of Semantic MediaWiki content pages that we have developed which function as a collection of broadly useful enterprise-ready business process tools that both NASA and the entire Mediawiki community can share in...



NASA GRC-ATF sees “**Project Open CSP**” as having the same vision

Thank you!